A.3 CONDENSER FOR VOC CONTROL--FACILITY C

"This page intentionally left blank."

EXAMPLE COMPLIANCE ASSURANCE MONITORING:
CONDENSER FOR VOC CONTROL--FACILITY C

I. Background

A. Emissions Unit

Description:	Storage tank
Identification:	T-200-7
Facility:	Facility C Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation No.:	40 CFR 63, Subpart G [Note 1]
Regulated pollutant (PSEU):	VOC
Emission limit:	95 percent reduction
Monitoring requirements:	Continuously monitor outlet vent temperature.

C. Control Technology: Two refrigerated condensers

II. Monitoring Approach

The key elements of the monitoring approach for VOC, including the indicators to be monitored, indicator ranges, and performance criteria, are presented in Table A.3-1.

TABLE A.3-1. MONITORING APPROACH

I. Indicator	Outlet vent temperature
Measurement Approach	The outlet vent temperature is monitored with a thermocouple.
II. Indicator Range	An excursion is defined as a daily average condenser outlet temperature of greater than -60°F. Excursions trigger an inspection, corrective action, and a reporting requirement.
III. Performance Criteria A. Data Representativeness[a]	The sensor is installed at the outlet vent of the condenser sufficiently close (within 2 feet) to the condenser to provide a representative outlet temperature. The minimum accuracy is ±4°F.
B. Verification of Operational Status	N/A
C. Quality Assurance and Control Practices	Annual calibration is performed: (1) on the thermocouple by measuring the voltage generated and (2) on the transmitter by attaching a calibrator to the input of the transmitter, generating a voltage, and checking the corresponding output of the transmitter.
D. Monitoring Frequency	Temperature is measured continuously.
Data Collection Procedures	15-minute data points are sent to the DCS.
Averaging Period	Hourly averages of four 15-minute temperature readings are calculated for tracking of the outlet temperature. A daily average of all 15-minute temperature readings is recorded for compliance purposes.

[a]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

JUSTIFICATION

I. Background

The pollutant specific emissions unit (PSEU) is the propionaldehyde storage tank (fixed roof). The storage tank capacity is 173,000 gallons. Emissions from the propionaldehyde storage tank are vented to two refrigerated condensers. The propionaldehyde emissions are vented to one of the two condensers at all times; one condenser is online while the other is defrosting on a 4-hour cycle. The condensers are used to reduce VOC emissions. Maximum uncontrolled emissions from this tank are estimated to vary from 154 lb/hr in the winter to 175 lb/hr in the summer. Based on the design of the PSEU, bypass of the control device cannot occur.

II. Rationale for Selection of Performance Indicators

Reduction of the emissions from storage tanks is required; these emissions are reduced with a refrigerated condenser. Monitoring of the outlet vent temperature indicates the level of condensation occurring in the condenser. Outlet vent temperature is a good indicator of the operation of the condenser because the concentration of the outlet vent stream can be determined based on temperature of the stream and vapor pressure equilibrium data. To achieve the outlet concentration, the outlet vent temperature must be maintained below a certain level (i.e., a maximum temperature). If the outlet vent temperature increases above the maximum temperature limit, condensation of the components to the level expected will not occur. An increase in outlet vent temperature indicates a reduction of performance of the condenser.

III. Rationale for Selection of Indicator Ranges

The indicator range was established based upon engineering calculations and historical monitoring data. The emission standard requires a 95 percent reduction efficiency. Maximum emission conditions for this tank are during tank loading at the highest ambient temperature the tank experiences (summer conditions). Engineering calculations were used to establish the required condenser vent temperature to achieve a 95 percent reduction under these conditions. The temperature of the vapor in the tank and at the inlet to the condenser were assumed to be ambient. The tank vapor was assumed to be at atmospheric pressure. The concentration of propionaldehyde in the vapor (calculated based on the vapor pressure of propionaldehyde at ambient conditions) and the fill rate during tank loading were used to determine the maximum uncontrolled emission rate. The emissions at a 95 percent reduction efficiency were calculated, and the corresponding temperature needed to achieve the allowed propionaldehyde concentration (vapor pressure) was determined. The maximum allowed outlet vent temperature was determined to be 7°F. The outlet vent temperature must be maintained at this temperature or lower to achieve 95 percent reduction in the summer. Under winter conditions, a 95 percent reduction is achieved at an outlet vent temperature of -50°F. No lower limit to the indicator range is necessary. No performance test has been performed on the control device, and no test is planned.

In addition to the engineering calculations performed, monitoring data were reviewed to determine whether the condenser temperature could be maintained during normal operation of the storage tank and condenser. Six weeks of monitoring data for outlet vent temperatures (April 23 through June 3, 1997) have been collected and reviewed. These outlet vent temperature data include hourly average temperatures for periods when the condensers were online (i.e., offline cycles, lasting 4 hours each, are not included on the graph). Figure A.3-1 presents these data. During the 6-week period, the hourly average outlet vent temperatures while online ranged from-85° to -64°F. Daily average temperatures while online for the 6-week period ranged from-80° to -78°F. The daily average temperatures are shown in Figure A.3-2. The condenser was consistently operating with both hourly and daily average outlet vent temperatures below the maximum temperature determined in calculations. Data for 15-minute temperature readings were also available for 4 days for both the online and offline cycles for both condensers. Two days of 15-minute readings are shown in Figure A.3-3, and 4 days of 15-minute readings are shown in Figure A.3-4. The 15-minute readings range from approximately -89° to -77°F.

The selected indicator range is "a daily average temperature of less than -60 °F." This range was selected by taking the highest daily average observed temperature value (-78°F) during the 6-week period for which monitoring data were available (April through June) and adding a 20 percent buffer. At the selected indicator range, the condenser will still be operating well below temperature required to achieve compliance (-50°F). When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported. No QIP threshold has been selected.

NOTE 1: This source is exempt from CAM because 40CFR63, Subpart G was proposed after November 15, 1990. Nonetheless, a CAM plan was prepared from information and data obtained from this facility as an example of a monitoring approach and the selection of an indicator range.

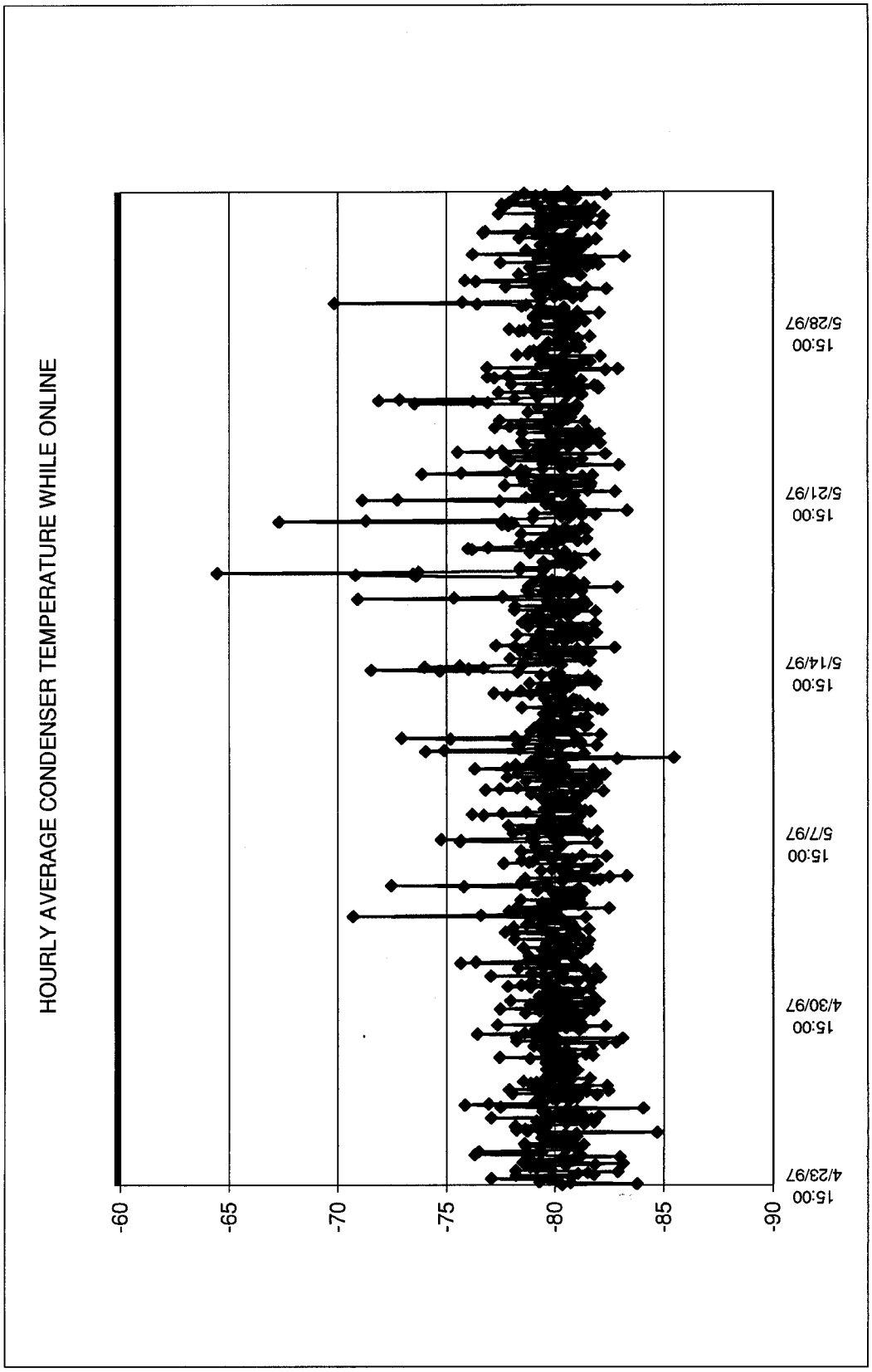
HOURLY AVERAGE CONDENSER TEMPERATURE WHILE ONLINE
-60
-65
-70
-75
-80
-85
-90
15:00 4/23/97
15:00 4/30/97
15:00 5/7/97
15:00 5/14/97
15:00 5/21/97
15:00 5/28/97

Figure A.3-1.

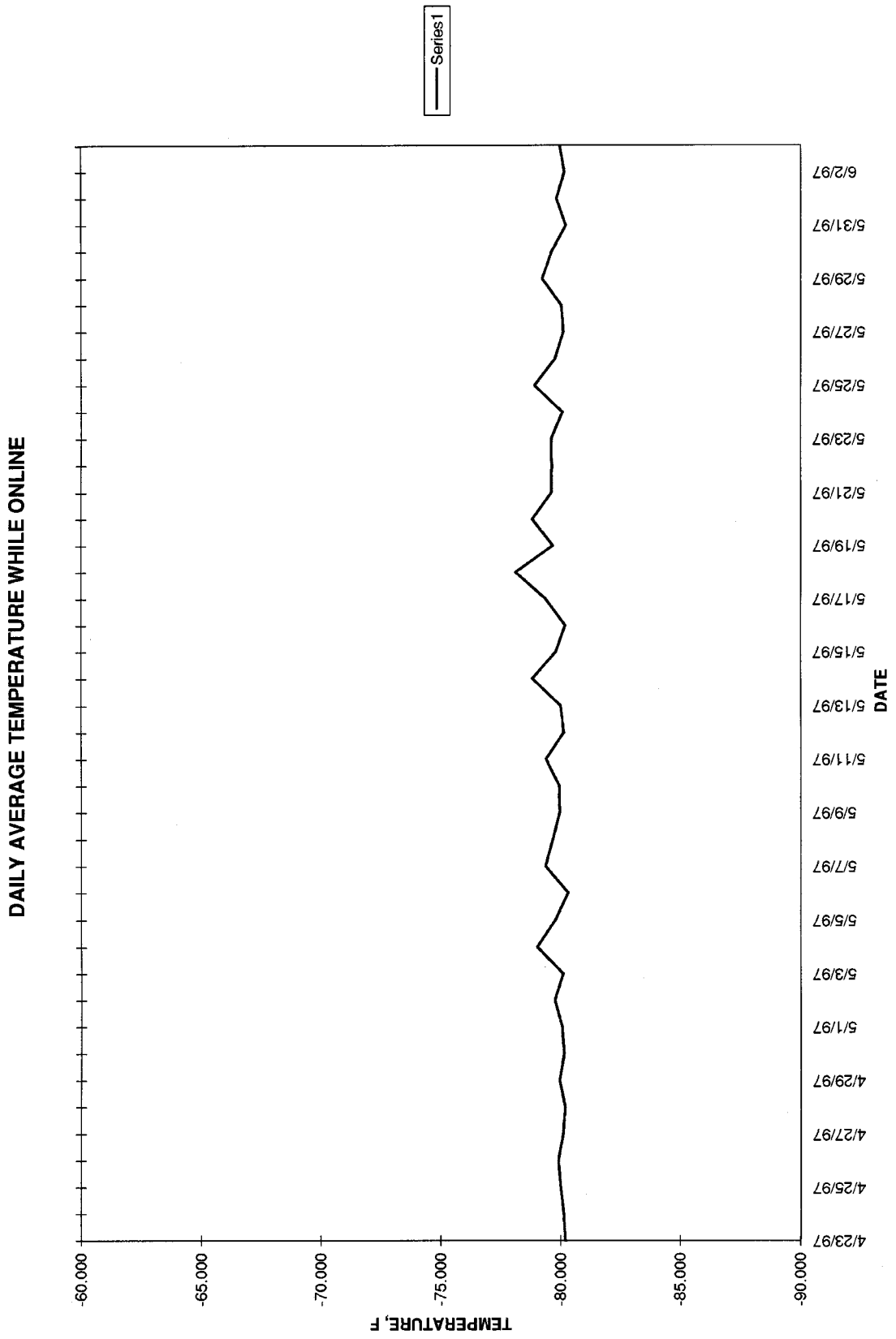
DAILY AVERAGE TEMPERATURE WHILE ONLINE
Series1
TEMPERATURE, F
-60.000
-65.000
-70.000
-75.000
-80.000
-85.000
-90.000
DATE
4/23/97
4/25/97
4/27/97
4/29/97
5/1/97
5/3/97
5/5/97
5/7/97
5/9/97
5/11/97
5/13/97
5/15/97
5/17/97
5/19/97
5/21/97
5/23/97
5/25/97
5/27/97
5/29/97
5/31/97
6/2/97

Figure A.3-2

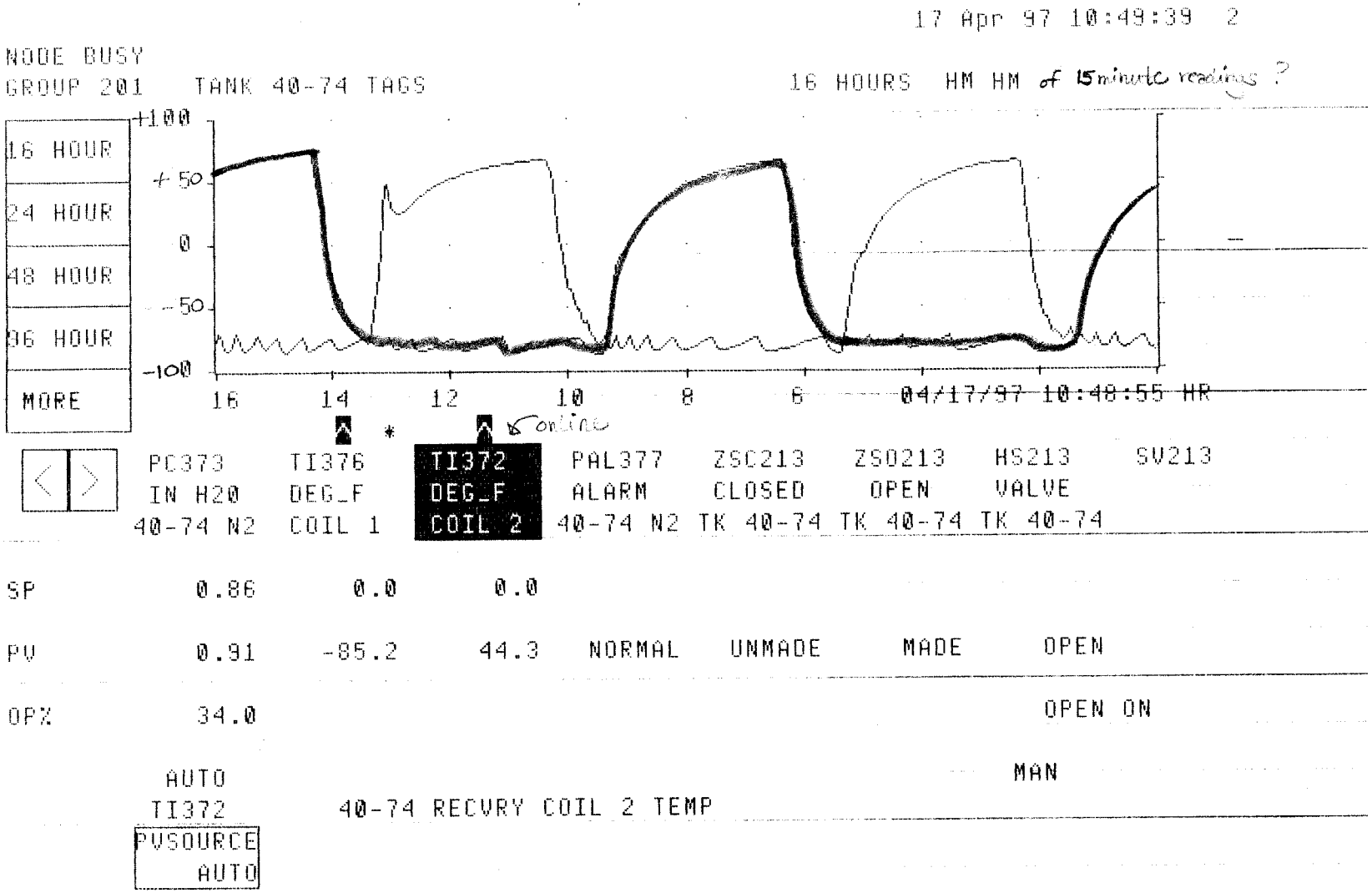
17 Apr 97 10:49:39 2
NODE BUSY
GROUP 201 TANK 40-74 TAGS
16 HOURS HM HM of 15 minute readings ?
16 HOUR
24 HOUR
48 HOUR
96 HOUR
MORE
+100
+50
0
-50
-100
16 14 12 10 8 6
04/17/97 10:48:55 HR
online
PC373 IN H20 40-74 N2
TI376 DEG_F COIL 1
TI372 DEG_F COIL 2
PAL377 ALARM
ZSC213 CLOSED
ZSO213 OPEN
HS213 VALVE
SV213 40-74 N2 TK 40-74 TK 40-74 TK 40-74
SP 0.86 0.0 0.0
PV 0.91 -85.2 44.3 NORMAL UNMADE MADE OPEN
OP% 34.0 OPEN ON
MAN
AUTO
TI372
PVSOURCE
AUTO
40-74 RECVRY COIL 2 TEMP

Figure A.3-3.

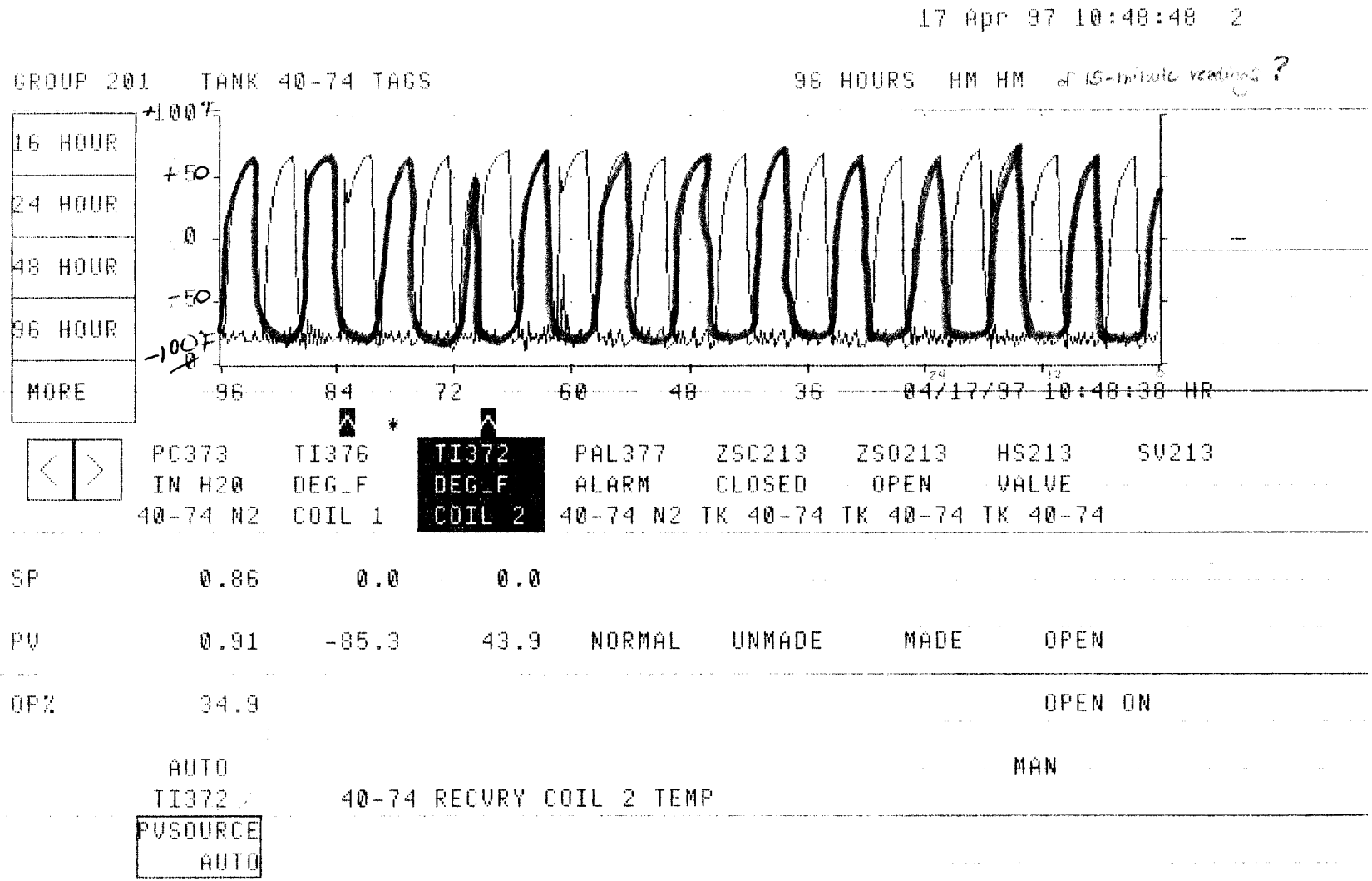
17 Apr 97 10:48:48 2
GROUP 201 TANK 40-74 TAGS
96 HOURS HM HM
16 HOUR
24 HOUR
48 HOUR
96 HOUR
MORE
+100°F
+50
0
-50
-100°F
96 84 72 60 48 36 04/17/97 10:48:38 HR
PC373 IN H20 40-74 N2
TI376 DEG_F COIL 1
TI372 DEG_F COIL 2
PAL377 ALARM
ZSC213 CLOSED
ZSO213 OPEN
HS213 VALVE
SV213 40-74 N2 TK 40-74 TK 40-74 TK 40-74
SP 0.86 0.0 0.0
PV 0.91 -85.3 43.9 NORMAL UNMADE MADE OPEN
OP% 34.9 OPEN ON
AUTO MAN
TI372 40-74 RECVRY COIL 2 TEMP
PVSOURCE AUTO

Figure A.3-4.